بسم الله الرحمن الرحيم

خوارزميات في التحليل العددي
مكتوبة بلغة السي بلس بلس

إعداد/بشير عبده فارع محمد العبسي

هذا الكتاب اهدأ إلى كل طلاب سوا في داخل جامعة تعز أو خارجها أو حتى من خارج هذا البلد الطيب اتمنا إلى الجميع التوفيق والنجاح . يحوي هذا الكتاب خوارزميات التالية (bi-secti _ f-p_ gauss_ gramer _ guass siedel method_ jaccobi methoh)

لمراسلة أو الاستفسار

الجمهويه اليمنية

تعز

basheer2010.55@gmail.com

BI-SECTI-Notepad:

```
#include"iostream.h"
#include"conio.h"
#include"math.h"
#include"iomanip.h"
const int TOL=0.00001;
float f(float x){return x*x*x-x-1;};
void main()
{
  clrscr();
  float a,b,i,c;
  int max;
  cout<<"\n\n ENTER THE  a:   ";
  cin>>a;
  cout<<"\n\n ENTER THE  b:  ";
  cin>>b;
  cout<<"\n\n PLEASE ENTER THE MAX OF ITERATION:  ";
  cin>>max;
  i=1;
  if((f(a)*f(b))<0)
  {
    cout<<"\n\n i\t\t c[i]\t\t  f(ci)\n";
      while(i<=max)
```

```
  {
     c=(a+b)/2;
   if(abs(f(c))<=TOL)
   cout<<"\n"<<i<<setw(14)<<c<<setw(20)<<f(c);
   if(f(a)*f(c)<0)
         b=c;
   else
         a=c;
     i++;
         }
         if(i>max)
         cout<<"\n\tprocedures completed successful";
         }
         else
          cout<<"\n\tprocedures completed un_successful";

          getch();
          }
```

F-P:

```
#include"iostream.h"
#include<stdlib.h>
#include<iomanip.h>
#include<conio.h>
```

```
#include<math.h>
double f(double);
void   main()
  {
        clrscr();
   float x0,xi;
   int   no,i;
        /* FIXED POINT  METHOD FIND f(x)= cos(x)-x */
        cout<<"\n\n PLEASE ENTER THE INITIAL VALUE:  ";
        cout<<"x0=  ";
        cin>>x0;
        cout<<"\n\n PLEASE ENTER THE NUMBRE OF ITERATIONS:  ";
        cout<<"no=  ";
        cin>>no;
cout<<"=============================================
=======";
        cout<<"\n"<<setw(16)<<"no"<<setw(14)<<"xi"<<setw(14)<<"f(xi)"<<"\
n";
cout<<"=============================================
=======\n";
     i=1;
   while(i<=no)
         {
           xi=cos(x0);
        if (fabs(f(xi))<=0.00001)
         {
```

```
            cout<<"\n\n\t  PROGRAM COMPLETE SUCCESSFULY ";
            getch();
            exit(1);
              }
                  cout<<setw(16)<<i<<setw(16)<<x0<<setw(16)<<f(x0)<<endl;
                i++;
                x0=xi;

                }

             cout<<"\n\n\t PROCEDURE COMPLETED UN_SUCCESSFULY";
            getch();
}
```

GAUSS-Notepad:

```
#include"iostream.h"
#include"conio.h"
#include"math.h"
#include"iomanip.h"
const int TOL=0.00001;
float f(float x){return x*x*x-x-1;};
void main()
{
  clrscr();
```

```
float a,b,i,c;
int max;
cout<<"\n\n ENTER THE  a:   ";
cin>>a;
cout<<"\n\n ENTER THE  b:  ";
cin>>b;
cout<<"\n\n PLEASE ENTER THE MAX OF ITERATION:  ";
cin>>max;
i=1;
if((f(a)*f(b))<0)
{
  cout<<"\n\n i\t\t c[i]\t\t  f(ci)\n";
    while(i<=max)
 {
     c=(a+b)/2;
  if(abs(f(c))<=TOL)
  cout<<"\n"<<i<<setw(14)<<c<<setw(20)<<f(c);
  if(f(a)*f(c)<0)
        b=c;
  else
        a=c;
    i++;
        }
        if(i>max)
        cout<<"\n\tprocedures completed successful";
        }
```

```
          else
           cout<<"\n\tprocedures completed un_successful";


           getch();
           }
```

GRAMER-Notepad:

```
#include<iostream.h>
#include<conio.h>
double delta(double a[][3])
{
  double dd;
          dd=a[0][0]*(a[1][1]*a[2][2] -a[1][2]*a[2][1])-a[0][1]*(a[1][0]*a[2][2]-a[1]
[2]*a[2][0])+a[0][2]*(a[1][0]*a[2][1] -a[1][1]*a[2][0]);
     return dd;
 }
void main()
{
           clrscr();
  double  a1[3][3],a[3][3],b[3],d[3],x[3];
  double  da,dx,dy,dz,i,j;
           cout<<"\n\n\n\t\t ENTER  COEFFICIENT OF a (3 X 3) :\n\t\t\t";
      for(i=0;i<3;i++)
           {
            for(j=0;j<3;j++)
               {
                    cin>>a[i][j];
```

```
        a1[i][j]=a[i][j];
    }
        cout<<"\t\t\t";
 }
       cout<<"\n\t\t ENTER THE CONTANTS OF b (1 X 3) :\n\t\t\t";
for(i=0;i<3;i++)
    cin>>b[i];
    da=delta(a);
for(i=0;i<3;i++)
    a1[i][0]=b[i];   // CALCUTION OF DELTA X
    d[0]=delta(a1);
for(i=0;i<3;i++)
for(j=0;j<3;j++)
    a1[i][j]=a[i][j];
for(i=0;i<3;i++)
    a1[i][1]=b[i];   // CALCUTION OF  DELTA Y
    d[1]=delta(a1);
for(i=0;i<3;i++)
for(j=0;j<3;j++)
    a1[i][j]=a[i][j];
for(i=0;i<3;i++)
    a1[i][2]=b[i];   // CALCUTION OF DELTA Z
    d[2]=delta(a1);
    cout<<"\n\n\t\t THE DELTA  DX = "<<da<<"\n\n";
for(i=0;i<3;i++)
    cout<<"\t\t d["<<i<<"]= "<<d[i]<<"\n\n";
```

```
            for(i=0;i<3;i++)
              {
                   x[i]=d[i]/da;
                   cout<<"\t\t x["<<i<<"]= "<<x[i]<<"\n\n";
                  }
                   getch();
 }
```

guass siedel method- Notepad:

```
#include <cstdlib>
#include <iostream>
#include<iostream.h>
#include<conio.h>
#include<math.h>
#include<iomanip.h>

using namespace std;

int main(int argc, char *argv[])
{
     clrscr();
   cout<<"\n\n\n\n\t\t\t Guass Siedel Method \n"
         <<"\n\t   The linear systems are :- \n\n\n"
         <<"\t   10x1 - 2x2  - x3   - x4   = 3\n"
         <<"\t   -2x1 + 10x2 - x3   - x4   = 15\n"
         <<"\t   -x1  - x2   + 10x3 - 2x4  = 27\n"
```

```
        <<"\n\n\t   Number of iteration = 15 , TOL=0.00001\n\n" ;
   double x[4],sum[4],x0[4]={0},d=0.00001,t,s[4];
   int k=1,max=6,j,i;
   double a[4][4]={10,-2,-1,-1,
                   -2,10,-1,-1,
                   -1,-1,10,-2,
                   -1,-1,-2,10},
          b[4]={3,15,27,-9};


cout<<setw(5)<<"i"<<setw(15)<<"x1"<<setw(15)<<"x2"<<setw(15)<<"x3"<<s
etw(15)<<"x4\n"
      <<"
"<<"*****************************************************\n";
   while(k<=max)   {
      t=0;
      for(i=0;i<4;i++){
          sum[i]=s[i]=0;
          for(j=0;j<i;j++)
             s[i]+=a[i][j]*x[j];
          for(j=i+1;j<3;j++)
             sum[i]+=a[i][j]*x0[j];
          x[i]=(b[i]-sum[i]-s[i])/a[i][i];
          cout.precision(4);
          s[i]=pow(x[i]-x0[i],2);
          t+=s[i];
      }
```

```
      cout<<setw(5)<<k<<setw(15)<<x[0]<<setw(15)
           <<x[1]<<setw(15)<<x[2]<<setw(15)<<x[3]<<"\n";
      if(sqrt(t)<d)       {
           cout<<" OUTPUT :- \n ";
           cout<<setw(5)<<k<<setw(15)<<x[0]<<setw(15)<<x[1]
              <<setw(15)<<x[2]<<setw(15)<<x[3]<<"\n"
              <<"\t\t Completed  successfully ...";
           getch();
           return;
      }
      k++;
      for(i=0;i<3;i++) x0[i]=x[i];
   }
   cout<<"\n\n\t\t Procedures completed  successfully ...";
   getch();}

    system("PAUSE");
    return EXIT_SUCCESS;
}
```

JAC1-Notepad:

```
#include<iostream.h>
#include<stdlib.h>
#include<conio.h>
#include<math.h>
```

```
#include<iomanip.h>
void main()
{
   clrscr();
   int n,no,j,i,k;
   double a[20][20],b[20];
   cout<<"\t\t*** JACCOBI METHOD *** \n" ;
   cout<<"enter the number of equations:   " ;
   cin>>n;
    cout<<"\n enter the Number of iteration: no=  ";
    cin>>no;
   double x[20][20],sum[20];
    cout<<"enter the coefficientes of x:\n ";
    for(i=0;i<n;i++)
       for(j=0;j<n;j++)
       cin>>a[i][j];
       cout<<"\n enter the coefficientes of b: ";
       for(i=0;i<n;i++)
       cin>>b[i];
       cout<<"enter the intial values:  ";
       cin>>x[0][0]>>x[1][0]>>x[2][0];
       cout<<"\n"<<setw(5)<<"k"<<setw(5)<<"i"<<setw(10)<<"xn"<<"\n";
       k=1;
   while(k<=no) //for(k=1;k<no;k++)
   {
      for(i=0;i<n;i++)
```

```
        {
          sum[i]=0;
        for(j=0;j<n;j++)
            if(i!=j)
             sum[i]+=a[i][j]*x[j][k-1];

         }
    for(i=0;i<n;i++)
          x[i][k]=(b[i]-sum[i])/a[i][i];

        //
cout<<"=============================================================\n";

    if(fabs(x[i][k]-x[i][k-1])<=0.00001)
    {
         cout<<"\n procedure compelete successfuly";
        getch();
        exit(1);
        }

         for(i=0;i<n;i++)
         cout<<setw(5)<<k<<setw(5)<<i<<setw(15)<<"x["<<i<<"]="<<x[i]
[k]<<"\n";
         //x[i][k-1]=x[i][k];
         k++;
```

```
   }
   cout<<"\n procedure un_successfully \n";
   getch();
}
```

jaccobi methoh-notepad:

```
#include <cstdlib>
#include <iostream>
#include<conio.h>
#include<math.h>
#include<iomanip.h>

using namespace std;

int main(int argc, char *argv[])
{
     clrscr();
   cout<<"\n\n\t\t\t*** JACCOBI METHOD ***\n\n\n"
       <<"\t\t FUNCTIONS ARE :- \n"
       <<"\t\t 10x1  - x2    + 2x3  -x4   = 3\n"
       <<"\t\t -x1   + 11x2  - x3   + 3x4 = 25\n"
       <<"\t\t 2x1   - x2    + 10x3 - x4  = -11\n"
       <<"\t\t Number of iteration = 19 ; TOL=0.000001\n\n\n\n" ;
   double x[4],sum[4],x0[4]={0},d=0.00001,t;
```

```
   int k=1,m=30,j,i;
   double a[4][4]={10,-2,-1,-1,
                   -2,10,-1,-1,
                   -1,-1,10,-2,
                   -1,-1,-2,10},
          b[4]={3,15,27,-9};

cout<<setw(5)<<"i"<<setw(15)<<"x1"<<setw(15)<<"x2"<<setw(15)<<"x3"<<s
etw(15)<<"x4\n"
      <<"  ************************************************\n";
   while(k<=m)
   {
      for(i=0;i<4;i++)
      {
          sum[i]=0;
          for(j=0;j<3;j++)
            if(i!=j)
                 sum[i]+=a[i][j]*x0[j];
      }
      t=0;
      for(i=0;i<4;i++)
      {
           x[i]=(b[i]-sum[i])/a[i][i];
           sum[i]=pow(x[i]-x0[i],2);
           t+=sum[i];
      }
      cout<<setw(5)<<k<<setw(15)<<x[0]<<setw(15)
```

```
          <<x[1]<<setw(15)<<x[2]<<setw(15)<<x[3]<<"\n";
      if(sqrt(t)<d)       {
         //cout<<"\t\t OUTPUT :- \n ";
          cout<<setw(5)<<k<<setw(15)<<x[0]<<setw(15)<<x[1]
              <<setw(15)<<x[2]<<setw(15)<<x[3]<<"\n"
              <<"\t\t Complete  successfully ...";
          getch();return;       }
      k++;
      for(i=0;i<3;i++) x0[i]=x[i];
   }
   cout<<"\n Procedure isn't successfully \n";
   getch();
}


    system("PAUSE");
    return EXIT_SUCCESS;
}
```

مع تحيات :

بشير عبده فارع محمد العبسي

اليمن

تعز

713243206

basheer2010.55@gmail.com